Department of Physics

Teaching Plan 2024-25

B.Sc- I

Course Teacher: Prof. O. V. Magdum
Course Title: DSC Electricity & Magnetism I (Sem-I)

Month	Theory Component	Practical CIE Component
July	**Admission process**	
August	**Module I :** **Unit I - Vector Analysis :** Vector algebra, Gradient, divergence, Curl and their significance, Vector Integration, surface and volume integrals of vector fields, divergence theorem and stokes theorem of vectors (statement only).	
September	**Unit II –** **Electrostatics I :** Electrostatics field, Electric flux, Gauss′s theorem of electrostatics, electric potential as line integral of electric field, potential due to charge ,electric dipole, uniformly charged spherical shell and solid sphere, calculation of electric field from potential. **Module II :** **Unit I – Electrostatics II :** Capacitance of an isolated spherical conductor parallel plate, spherical and cylindrical condenser, energy per unit volume in electrostatic field.	
October	**Unit II – Dielectrics :** Polarisation of dielectric and polarisation vector, displacement vector, electric vector, relation between E, P and D vectors, electric susceptibility of dielectrics.	
November	**Exam Related Work**	
	Course Title: DSC Electricity & Magnetism II (Sem-II)	

December	**Module I :** **Unit I – Magnetism I :** Magnetostatic : Bio-Savart's law and its application, Straight conductor, circular coil, solenoid carrying current, Divergence and Curl of Magnetic field, Magnetic Vector potential, Ampere's circuital law,	
January	**Unit II - Magnetism II :** Magnetic properties of materials, Magnetic intensity, Magnetic induction, Permeability, Magnetic susceptibility, Brief introduction of dia- magnetic, para- magnetic and ferro-magnetic materials. **Unit I – Electromagnetic Induction :** Faraday's laws of electromagnetic induction, Lenz's law, Self and mutual inductance, Self inductance of single coil, Mutual inductance of two coils, Energy stored in magnetic field.	
February	**Unit II – A.C. Circuits :** Complex numbers and their application in solving AC series LCR circuit, Complex Impedance, Reactance, Admittance and Susceptance, Resonance in series LCR circuit, Sharpness of resonance (qualitative treatment only), Q factor(definition), AC Bridge- Owen's Bridge.	
March	**Practical Exam Related Work**	
April	**Theory Exam Related Work**	

Department of Physics

Teaching Plan 2024-25

B.Sc- II

Course Teacher: Prof. O. V. Magdum
Course Title: DSC Waves & Acoustics of Buildings (Sem-III)

Month	Theory Component	Practical CIE Component
July	**Admission process**	
August	**Module I :** **Unit I - Superposition of Harmonic Oscillations :** Linearity and superposition principle, Superposition of two collinear harmonic oscillations- for oscillations having equal frequencies (Analytical method) and oscillations having different frequencies (Beats),Superposition of two perpendicular harmonic oscillations- for oscillations having equal frequencies (Analytical method) and oscillations having different frequencies (Lissajous figures), Uses of Lissajous figures. **Unit II – A) Coupled Oscillations :** Frequencies of coupled oscillatory systems, normal modes and normal co-ordinates of vibrations, Degrees of freedom, Energy transfer in coupled oscillatory system.	**Group I (Thermal Physics and Statistical Mechanics I) :** 1. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus. 2. To determine the coefficient of thermal conductivity of a bad conductor by Lee andCharlton's disc method. 3. To determine the temperature co-efficient of resistance by Platinum resistancethermometer. 4. To study the variation of thermoe.m.f. across two junctions of a thermocouple with temperature. 5. To record and analyze the cooling temperature of hot object as a function of time using a thermocouple.
September	**B) Waves Motion and Ultrasonic waves :** Waves Motion: Transverse waves on a string, travelling and standing waves on a string, Normal modes of a string, Group velocity and Phase velocity, Ultrasonic waves: Piezo-electric effect, Production of ultrasonic waves by Piezo-electric generator, Detection of ultrasonic waves, Properties ultrasonic waves, Applications of ultrasonic waves.	6. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge. 7. To determine the value of Stefan's constant. 8. To determine Newton law of cooling.

	Module II : **Unit I - Sound and Acoustics of buildings :** Sound: Transducers and their characteristics, Pressure microphone, Moving coil loudspeaker, Acoustics of buildings: Reverberation and time of reverberation, Absorption coefficient, Sabine's formula for measurement of reverberation time.	**Group II (Waves and Acoustics of Buildings) :** 1. To investigate the motion of coupled oscillators 2. To determine the frequency of an electrically maintained tuning fork by Melde'sexperiment and to verify λ2– T Law 3. To study Lissajous figures by using CRO
October	**Unit II – Viscosity :** Revision of viscosity, stream line flow, trubulent flow, Rate flow of liquid in a capillary tube - Poiseuille's formula, experimental determination of coefficient of viscosity of a liquid by Poiseuille's apparatus method, variations of viscosity of a liquid with temperature.	4. To determine coefficient of viscosity of water by capillary flow method (Poiseuille'smethod) 5. To determine velocity of sound in air by Kundt's tube and audio oscillatoror Phase shift method (CRO and microphone). 6. To determine viscosity of liquid by Searle's viscometer. 7. To determine velocity of sound in air by resonating bottle. 8. To determine frequency of a crystal oscillator
November	**Exam Related Work**	
	Course Title: DSC Optics (Sem-IV)	
December	**Module I :** **Unit I - Cardinal points :** Cardinal points of an optical system (definitions only), graphical construction of image using cardinal points, Newton's formula, relation between f and f ' for any optical system, relation between lateral, axial and angular magnifications.	**Group III (Thermal Physics and Statistical Mechanics II) :** 1. To determine the temperature coefficient of resistance using post office box. 2. To verify Stefan's fourth power law.

	Unit II –A) Resolving Power of optical instruments : Resolution, Resolving power of optical instruments, Rayleigh's criterion for the limit of resolution, Modified Rayleigh's criterion, comparison between magnification and resolution, resolving power of plane diffraction grating, resolving power of a prism.	3. To determine specific heat of graphite. 4. To determine the ratio of specific heat of air by Kundt's tube. 5. To determine Joules constant by electric method
January	**B) Polarization of light :** Idea of polarization, polarization by double refraction, Huygens explanation of double refraction through uniaxial crystals, Nicol prism(construction, working), production and detection of circularly and elliptically polarized light, optical rotation - laws of rotation of plane of polarization, polarimeter, Lauren half shade polarimeter **Module II :** **Unit I – Interference :** Principle of Superposition ,Coherence and condition for interference, Division of amplitude and division of wave front, Division of wave front – Lloyds single mirror(determination of wavelength of light of monochromatic source),Division of amplitude- Interference in thin parallel films (reflected light only), Wedge shaped films, Newton's rings and its application for determination of wavelength and refractive index of light.	6. To determine the coefficient of thermal expansion in solids 7. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method. 8. To determine the thermal conductivity of metal bar by Forbes's method. **Group IV (Optics) :** 1. To determine the Resolving Power of a Prism. 2. To determine the Resolving Power of a Plane Diffraction Grating. 3. To determine wavelength of sodium light using diffraction due to straight edge.
February	**Unit II – Diffraction :** Fraunhofer diffraction- Elementary theory of plane diffraction grating, Determination of wavelength of light using diffraction grating, Theory of Fresnel's half period zones, Zone plate (construction , working and its properties), Fresnel's diffraction at a straight edge.	4. To determine wavelength of sodium light using Newton's Rings. 5. To determine wavelength of Laser light using diffraction single slitS 6. Goniometer I-To study cardinal points of optical system 7. Goniometer II- To study the equivalent focal length of optical system.

		8. To study angle of specific rotation of sugar using Polarimeter.
March	**Practical Exam Related Work**	
April	**Theory Exam Related Work**	